

**Remarks**

The Office Action mailed 15 August 2001 has been received and reviewed. Claims 64-93 have been added and claims 56-61 have been cancelled. Therefore, the pending claims are claims 64-93.

**New Claims**

Claims 64-93 have been added to more completely claim the present invention. No new matter was added.

Claim 89 substantially includes the elements of original claim 56 and incorporating the elements of original claim 61. Claims 90-93 substantially include the elements of original claims 57-60.

Applicants have also resubmitted claims that were previously cancelled in the Response dated 6 July 2001 due to the retraction of the allowance of claims 56-61. Claim 38 is now new claim 64, claim 37 is now new claim 65, and claim 39 is now new claim 66. Further, claims 46-55 are now new claims 67-76, and claims 62-63 are now new claims 78-79.

**The 35 U.S.C. § 112, Second Paragraph, Rejection**

The Examiner rejected claim 60 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. However, claim 60 has been cancelled, rendering this rejection moot.

**The 35 U.S.C. § 103(a) Rejection**

The Examiner rejected claims 56-61 under 35 U.S.C. § 103(a) as unpatentable over Tsai et al. (U.S. Patent No. 5,486,266) in view of Thiel (U.S. Patent No. 4,316,765). Applicants respectfully traverse this rejection. However, to move the case to issuance, claims 56-61 have been cancelled, and claim 89 has been written to incorporate the elements of claim 61 into claim

56, with claims 90-93 corresponding to original claims 57-60 depending therefrom. As such, claims 89-93 overcome any possible rejection based on Tsai et al.

### **The Tsai et al. Document**

Applicants respectfully submit that Tsai et al. does not render the pending claims of the present invention *prima facie* obvious for at least the following reasons.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. *See* M.P.E.P. § 2143.

Applicants submit that the claims of the present invention are not *prima facie* obvious in light of Tsai et al. because Tsai et al. does not teach or suggest all of the claim elements. For example, Tsai et al. does not teach or suggest a composition that is within the ranges recited in the claims of the present invention. Further, Tsai et al. does not teach or suggest the etch rates that are recited in the new claims, e.g., new claim 68.

Regarding the recited chemical composition, new claim 64, for example, recites an etching composition including a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 to about 1:1:5. The present invention utilizes the following commercially available concentrations of mineral acids: HCl is 37% by weight in deionized water; HNO<sub>3</sub> is 70% by weight in deionized water; H<sub>2</sub>SO<sub>4</sub> is 96% by weight in deionized water; H<sub>3</sub>PO<sub>4</sub> is 85% by weight in deionized water; and HF is 49% by weight in deionized water. *See* Specification, page 9, lines 20-27. Suitable peroxides include hydrogen peroxide, which is utilized in the present invention at a commercially available concentration of 29% by weight in deionized water. *See id.* at page 10, lines 4-6. In contrast, Tsai et al. teaches chemical compositions that utilize a 90% concentration of hydrogen peroxide, and a 38% concentration of HCl. Clearly, because Tsai et al. teaches compositions having a 90% concentration of hydrogen peroxide as

compared to a 29% concentration as recited in the claims of the present invention, Tsai et al. does not teach or suggest the same elements as those recited in the present invention.

Further, Tsai et al. does not teach or suggest any etch rates for the disclosed compositions. Instead of etching, Tsai et al. is concerned with cleaning the surface of a partially manufactured integrated circuit.

However, even though Tsai et al. does not teach or suggest etch rates, the Examiner alleges that the composition taught by Tsai et al. would inherently have the same etch rates as the claimed invention because it contains the same chemicals and with the same ratio as that of the claimed invention. Applicants traverse this allegation.

As mentioned above, the chemical compositions taught by Tsai et al. are not the same as those claimed in the present invention. If the prior art teaches the identical structure, the properties applicant disclosed and/or claims are necessarily present. *See In re Spada*, 911 F.2d 705, 709, 15 U.S.P.Q.2d 1655, 1658 (Fed. Cir. 199). Because Tsai et al. teaches concentrations of hydrogen peroxide that are different than those recited in the present invention, the chemical compositions taught by Tsai et al. are not identical in structure to those recited in the present claims. Therefore, Tsai et al. does not inherently teach the etch rates claimed in the present invention.

Further, Applicants are not asserting that all claimed ratios of etch compositions exhibit the claimed etch rates. On the contrary, the claims are directed to those etch compositions that have the desired etch rates. Tsai et al., on the other hand, does not teach the entire range of ratios that are claimed in the present invention, and Tsai et al. is silent regarding etch rates. Therefore, it is not necessarily inherent that Tsai et al. teaches the claimed etch rates, e.g., chemical compositions not taught in Tsai et al. may possess the desired etch rates as recited in the claims of the present invention.

**Amendment and Response**

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Serial No.: 09/560,268

Filed: 26 April 2000

For: COMPOSITION FOR SELECTIVELY ETCHING AGAINST COBALT SILICIDE (As Amended)

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**Summary**

It is respectfully submitted that the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for  
Lee et al.

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**CERTIFICATE UNDER 37 C.F.R. § 1.8:**

The undersigned hereby certifies that this paper is being deposited with the United States Postal Service as first class mail, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on this 15<sup>th</sup> day of November, 2001.

By: 

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**APPENDIX A - SPECIFICATION/CLAIM AMENDMENTS  
INCLUDING NOTATIONS TO INDICATE CHANGES MADE**

**Serial No.: 09/560,268  
Docket No.: 150.0056 0102**

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**In the Claims**

For convenience, all pending claims are shown below.

64. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).
65. (New) The etching composition according to claim 64, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.
66. (New) The etching composition according to claim 64, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).
67. (New) The etching composition according to claim 64, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.
68. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the composition has an etch rate greater than about 1000 Å/minute for cobalt.
69. (New) The etching composition according to claim 68, wherein the mineral acid is HCl.
70. (New) The etching composition according to claim 68, wherein the peroxide is hydrogen peroxide.



Amendment and Response - Appendix A

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71. (New) The etching composition according to claim 68, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

72. (New) The etching composition according to claim 68, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.

73. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water at a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water), wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.

74. (New) The etching composition according to claim 73, wherein the mineral acid is HCl.

75. (New) The etching composition according to claim 73, wherein the peroxide is hydrogen peroxide.

76. (New) The etching composition according to claim 73, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

77. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride and an etch rate greater than about 1000 Å/minute for cobalt.

78. (New) The etching composition according to claim 77, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

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79. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride.

80. (New) The composition according to claim 79, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

81. (New) The etching composition according to claim 80, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).

82. (New) The etching composition according to claim 81, wherein the composition comprises a ratio in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

83. (New) The composition according to claim 79, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.

84. (New) An etching composition, the composition comprising a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate greater than about 1000 Å/minute for cobalt.

85. (New) The composition according to claim 84, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

86. (New) The etching composition according to claim 85, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).

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87. (New) The etching composition according to claim 86, wherein the composition comprises a ratio in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

88. (New) The composition according to claim 84, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.

89. (New) An etching composition, the composition consisting essentially of a mineral acid, a peroxide, and deionized water, wherein the composition has an etch rate of about 50 Å/minute to about 250 Å/minute for metal nitride and an etch rate greater than about 1000 Å/minute for cobalt.

90. (New) The composition according to claim 89, wherein the mineral acid is HCl and the peroxide is hydrogen peroxide.

91. (New) The composition according to claim 90, wherein the composition comprises a ratio in a range of about 1:1:35 (mineral acid:peroxide:deionized water) to about 1:1:5 (mineral acid:peroxide:deionized water).

92. (New) The composition according to claim 91, wherein the ratio is in a range of about 1:1:25 (mineral acid:peroxide:deionized water) to about 1:1:10 (mineral acid:peroxide:deionized water).

93. (New) The composition according to claim 89, wherein the mineral acid is selected from the group consisting of HCl, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, and HF.